GENDER DIFFERENCES AND CORRELATES OF EXTREME DIETING BEHAVIOURS IN US ADOLESCENTS

Catherine S. Brown[1], Susanna Kola-Palmer[1], Katie Dhingra[2]

[1]The University of Huddersfield

[2]Manchester Metropolitan University

ADDRESS FOR CORRESPONDENCE:

Susanna Kola-Palmer

Department of Behavioural and Social Sciences

University of Huddersfield

Queensgate

Huddersfield

HD1 3DH

Ph: + 44 1484 471014

Email: s.kola-palmer@hud.ac.uk

Catherine S. Brown email: U1156903@unimail.hud.ac.uk

Katie Dhingra email: k.dhingra@mmu.ac.uk

Abstract

This paper examined correlates of and gender differences in extreme dieting behaviours (EDBs) among 15,425 US adolescents from the 2011 Youth Risk Behavior Survey. Suicidal thoughts and plans, and binge drinking were related to EDBs in females, but not in males. Suicide attempts, daily smoking, and marijuana use were related to EDBs in males, but not females. Results suggest EDBs are associated with a range of negative psychosocial factors and substance use behaviours, and that these differ for boys and girls. Additional research is required to elucidate these relationships, and these results provide a focus for future research, prevention and intervention efforts.

Keywords: Extreme dieting behaviours; Psychosocial Correlates; Youth Risk Behavior Survey (YRBS); Gender Differences.

Adolescents are at an increased risk of engaging in unhealthy or extreme weight control behaviours due to an enhanced concern over body shape and weight (Findlay, 2004, Thøgersen-Ntoumani et al., 2010). Unhealthy weight control behaviours can range from the reduction of food intake and skipping meals (Patton et al., 1997, Neumark-Sztainer et al., 2011) to more extreme behaviours such as vomiting and the consumption of laxatives (Crow et al., 2006) (Cruz-Sáez et al., 2013). Gender is known to be an important factor in disordered eating behaviours, but less is known about the underlying reasons for observed gender differences. Recent nationally representative figures suggest that in US high school students 61% of girls and 32% of boys are trying to lose weight; 12% reported fasting, 5% reported diet pill consumption, and 4% reported vomiting or laxative use (Eaton et al., 2012). Weight control behaviours are a public health concern due to their negative consequences, including increased risk of continuing the behaviour into early adulthood (Neumark-Sztainer et al., 2011), and increased risk of weight gain, obesity onset (Neumark-Sztainer et al., 2006) and eating disorder onset (Liechty and Lee, 2013). Efforts are, therefore, needed to identify the factors associated with extreme weight control behaviours. Both the associated factors of extreme dieting behaviours and the behaviours themselves should be addressed during adolescence to enhance prevention efforts. Many factors may contribute to these behaviours; however, associations with victimization, suicidal thoughts and behaviours, depressive symptoms, body weight perceptions, and psychoactive drug use have been shown in previous research to be of importance and are further examined in this study.

Previous research suggests an association between unwanted sexual experiences, such as those involving psychological or physical pressure, and disordered eating in adolescents (Capitaine et al., 2011). For example, in a large sample of US adolescents, an association between physical abuse from a partner and extreme weight control behaviours was found, with participants reporting dating violence and rape being more likely to report

vomiting, and the use of diet pills and laxatives in order to lose weight than those not reporting such experiences (Ackard and Neumark-Sztainer, 2002). Bullying is associated with weight control behaviours in adolescents (Farrow and Fox, 2011, Gonsalves et al., 2013, Lampard et al., 2014). Less is known about the association between electronic bullying and weight control behaviours, the relevance of which has increased in recent years (Kowalski and Limber, 2013). Girls are more likely to report being a victim of social, verbal and electronic bullying than boys (Farrow and Fox, 2011, Kowalski and Limber, 2007). However, it is currently unknown whether there are gender differences in the association between bullying and weight control behaviours.

Women experience higher rates of depression than men (Kessler, 2005), and these gender differences are evident from adolescence (Nolen-Hoeksema and Girgus, 1994). A number of studies have found associations between depressive symptoms and unhealthy weight control behaviours (Dennard and Richards, 2013, Liechty and Lee, 2013, Utter et al., 2012). However, in a study including gender as a possible moderator, Gillen et al. suggested that the association between depression and extreme weight control behaviours may be more complex. The results suggested that females with depressive symptoms engaged in higher levels of unhealthy dieting behaviours, whereas this association was not evident in males. These results indicate that gender needs to be considered in terms of the effect on extreme weight control behaviours (Gillen et al., 2012).

Few studies have considered the association between suicidal thoughts and behaviour and extreme weight control behaviours, despite the established link between eating disorders and suicidal behaviour (Pompili et al., 2004, Bulik et al., 2008). Strong associations have been found between suicide ideation and suicide attempts, and extreme dieting behaviours in a large US adolescent sample (Neumark-Sztainer et al., 1998). More recently, extreme weight control behaviours (e.g., diet pills, self-induced vomiting, laxative use) and less extreme

weight control behaviours (e.g., fasting, food restriction, smoke more cigarettes) were found to be associated with higher rates of suicidal ideation and suicide attempts in adolescents (Crow et al., 2008). Similarly, weight control behaviours are independently associated with suicidal thoughts and behaviours in adolescents (Kim et al., 2011). Gender seems to be an important factor in suicidal ideation and suicidal behaviour for adolescents (Beautrais, 2002), with a higher prevalence of death by suicide in adolescent males than adolescent females (Wasserman et al., 2005), but higher rates of suicide ideation and attempts in adolescent females than in adolescent males (Bridge et al., 2006). Further analysis of possible gender differences in the association between suicidal thoughts and behaviours and extreme weight control behaviours is, therefore, warranted.

Weight perception has been associated with extreme weight control behaviours; with overweight perceptions linked with more extreme weight control behaviours (Boutelle et al., 2002, Haley et al., 2010, Vander Wal, 2012). Previous studies have suggested that adolescent girls are more likely than boys to perceive themselves overweight (Neumark-Sztainer and Hannan, 2000). Weight perception is linked with body dissatisfaction, which is associated with eating disorders, extreme weight control behaviours, low self-esteem, depression, and risky health-behaviours, especially among adolescent girls (Liechty, 2010, Neumark-Sztainer et al., 2006). Studies have demonstrated that adolescents who engage in unhealthy or extreme weight control behaviours are more likely to engage in other risky health behaviours, such as alcohol, nicotine and drug use (Crow et al., 2006, Neumark-Sztainer et al., 1998, Piran and Robinson, 2006).

Extreme weight control behaviours have been shown to co-occur with other health-compromising behaviours in adolescents. One limitation of the adolescent dieting literature is that it focuses on adolescents as one group, largely failing to consider gender differences. Gender is an important predictor of body dissatisfaction and unhealthy eating behaviours (De

Young et al., 2010), and women demonstrate more disordered eating than men (Vander Wal, 2012). However, the reasons underlying the observed gender differences are poorly understood.

The present study considers the correlates of extreme weight control behaviours separately for boys and girls, in an attempt at identifying whether potential risk factors for extreme weight control behaviours differ depending on gender. The present study was based on a representative sample of US adolescents utilizing the 2011 YRBS data ((CDC), 2011). This study represents an extension of previous research, with the inclusion of electronic bullying as an aspect of victimization (Farrow and Fox, 2011), and further stratifying the analyses by gender. We hypothesized that victimization, suicidal thoughts and behaviours, depression, weight perceptions, and psychoactive substance use would be associated with extreme weight control behaviours.

Method

Sample

Participants included in the present secondary data analysis were acquired through the Youth Risk Behaviour Survey (YRBS). The YRBS 2011 included 97 questions designed to assess six health risk behaviours and demographic information. The YRBS data collection procedure involved voluntary, anonymous and fully consented participation. A representative sample from across the US was acquired through a two-stage cluster sample design, the first stage of which was based on the enrolment size of the schools and the probability of selection was proportionate to the number of students enrolled. The second stage took an opportunity based approach in that students in attendance at the time of administration were included in the survey. 15,425 adolescents were included in the YRBS, of which 52% were male and 48% were female. The sample included public and private high school students in grades 9-12. The overall response rate was 71%.

The current analysis included 7629 females and 7518 males. Participants ranged in age from 12 to 18 years.

Measures

Extreme dieting behaviours

One of the six health risk behaviours assessed by the YRBS 2011 was unhealthy eating and dietary behaviours, of which three items were utilised in the present study to represent extreme dieting behaviour: (1) 'During the past 30 days, did you go without eating for 24 hours or more (also called fasting) to lose weight or to keep from gaining weight?'; (2) 'During the past 30 days, did you take any diet pills, powders, or liquids without a doctor's advice to lose weight or to keep from gaining weight? (Do not include meal replacement products such as Slim Fast.); (3) 'During the past 30 days, did you vomit or take laxatives to lose weight or to keep from gaining weight?' Participants were required to answer either 'Yes' or 'No' to the previous questions, of which a 'Yes' response indicated extreme dieting behaviour (CDC 2011). We created a new variable by combining these three items, which indicated engagement in any of the three extreme dieting behaviours ('Yes' or 'No').

Demographics

Demographic information including age (categorical), sex (male or female) and ethnicity (Hispanic or Latino) was collected.

Victimisation

Four questions were utilised to assess a range of victimisation. Physical abuse from a partner was assessed with the question: 'During the past 12 months, did your boyfriend or girlfriend ever hit, slap, or physically hurt you on purpose?' Unconsented sex was measured using the

question: ‘Have you ever been physically forced to have sexual intercourse when you did not want to?’ Two types of bullying were additionally included: (1) Bullying in school was assessed with the question ‘During the past 12 months, have you ever been bullied on school property?; (2) Bullying electronically was measured by ‘During the past 12 months, have you ever been electronically bullied? (Include being bullied through e-mail, chat rooms, instant messaging, Web sites, or texting.)’ Participants responded with either ‘Yes’ or ‘No’. A ‘Yes’ response to each question would indicate the experience of an aspect of victimisation.

Suicidal thoughts and behaviours

Suicidal thoughts and behaviours were measured using three questions: (1) ‘During the past 12 months, did you ever seriously consider attempting suicide?’ assessed suicide thoughts; (2) ‘During the past 12 months, did you make a plan about how you would attempt suicide?’ assessed suicide planning; (3) ‘During the past 12 months, how many times did you actually attempt suicide?’ assessed the frequency of suicide attempts. The first two questions required a ‘Yes’ or ‘No’ response whereas the latter required an indication as to the specific number of suicide attempts. The five response options were: ‘0 times’, ‘1 time’, ‘2 or 3 times’, ‘4 or 5 times’, and ‘6 or more times’. The frequency of suicide attempts item was recoded as ‘No suicide attempt’ and ‘More than 1 suicide attempt’. ‘Yes’ responses and frequency of attempts of one and above indicated engagement in suicidality.

Weight perception

Weight perception was represented by one question: ‘How do you describe your weight?’ with five responses consisting of ‘very underweight’, ‘slightly underweight’, ‘about right’, ‘slightly overweight’, and ‘very overweight’. These were recoded as ‘about right’, ‘very or slightly underweight’ and ‘slightly or very overweight’.

Alcohol and Drug use

Nicotine use was assessed by one item ‘Have you ever smoked cigarettes daily, that is, at least one cigarette every day for 30 days?’ with ‘yes’ or ‘no’ response options. Binge drinking was assessed with the item ‘During the past 30 days, on how many days did you have 5 or more drinks of alcohol in a row, that is, within a couple of hours?’ with responses coded as ‘0 days’ and ‘1 or more days’. Drug use was assessed with the item ‘During the past 30 days, how many times did you use marijuana?’ with responses coded as ‘0 times’ and ‘1 or more times’.

Statistical analyses

Weighted percentages were initially assessed between the predictor and outcome variables. Three logistic regression analyses were conducted on the outcome variable extreme dieting behaviours and the predictor variables. To assess whether determinants of extreme dieting behaviour differ between males and females separate logistic regressions were conducted, to allow for identification of different potential risk factors for extreme dieting behaviours in males and females. The number of participants included in the logistic regression analyses was 11691, a reduced number when compared to the sample size due to missing values. The reference categories used throughout the logistic regressions were either ‘No’ responses which indicated no engagement in the specified behaviour, responses which represented the majority of a sample, or those that were suggested by previous research, for example research has suggested females engage in extreme dieting behaviours more than males (e.g. Gillen et al. 2012), therefore male was the reference category when considering sex. Data were analysed using IBM SPSS Statistics 20.

Results

Descriptive statistics

Descriptive statistics for all categorical variables are displayed in Table 1. Nearly half (46%) of participants reported that they were currently trying to lose weight but only 29% actually perceived they were overweight. This large difference between the two percentages suggests some participants were not trying to lose weight just to improve their health. Quite a high percentage of participants reported engaging in extreme dieting behaviours, for example over 12% of participants had not eaten for a 24 hour period in the past month in an attempt to lose weight.

[Insert Table 1 about here]

Logistic Regression

Table 2 displays the results from the logistic regression assessing the relationship between the variables and extreme dieting behaviours in the overall sample. Analyses indicated good model fit, $\chi 2$ (8) = 6.58; p = .58; Cox and Snell = .13; Nagelkerke = .23, and the correct classification of 85.7% of cases. Results indicate that females were more likely to report extreme dieting behaviours than males (OR=2.08). Participants that reported having been physically abused by their partner were 1.35 times more likely to engage in extreme dieting behaviours than those who did not report abuse. Participants who had experienced rape were 1.57 times more likely to engage in extreme dieting behaviours than those who had not. Participants were more likely to engage in extreme dieting behaviours if they had experienced bullying both in school (OR=1.38) and electronically (OR=1.33) when compared to participants who have not experienced bullying. Participants who had reported previously

feeling sad or hopeless were 2.06 times more likely to engage in extreme dieting behaviours than those who did not report hopelessness. Participants with suicidal thoughts in the past 12 months were 1.46 times more likely to engage in extreme dieting behaviours than participants who did not report suicidal thoughts. Participants who reported planning suicide were 1.36 times more likely to engage in extreme dieting behaviours than participants who did not report making suicide plans. Participants who had reported one suicide attempt (OR=1.32), were more likely to engage in extreme dieting behaviours than participants who did not report attempting suicide. In terms of weight perception the strongest contributing factor to extreme dieting behaviours was having slightly or very overweight perceptions (OR = 2.13). Binge drinking (OR = 1.67), daily smoking (OR = 1.32) and marijuana use (OR = 1.32) also emerged as significant correlates of extreme dieting behaviours.

[Insert Table 2 about here]

Gender split analysis

Logistic regression models were conducted to assess the retrospective predictors of extreme dieting behaviours for males and females separately (Table 3). Goodness-Of-Fit analyses indicated satisfactory model fit for males χ^2 (8) = 6.96, p =.54; Cox & Snell = .06, Nagelkerke = .14, and females χ^2 (8) = 9.95, p = .27; Cox & Snell = .15, Nagelkerke = .24. The models correctly classified 90.7% of male cases, and 80.6% of female cases.

Results indicate that being physically abused by partner is related to engagement in extreme dieting behaviours in both males (OR = 1.42) and females (OR = 1.37). Similarly, being raped is related to extreme dieting behaviours in both males (OR = 1.56) and females

(OR = 1.56). Being bullied in school (OR = 1.29 for males, OR = 1.46 for females) and being bullied electronically (OR = 1.48 for males, OR = 1.24 for females) is related to extreme dieting behaviours. Feeling sad or hopeless for two weeks or more in a row is associated with extreme dieting behaviours in both males (OR = 1.78) and females (OR = 2.23). Gender differences emerge in suicidal thoughts and behaviours, with suicidal thoughts (OR = 1.57) and suicide planning (OR = 1.39) related to extreme dieting behaviours in females, but not in males. Suicide attempts are related to extreme dieting behaviours in males (OR = 1.55), but not in females. Being overweight is a correlate of extreme dieting behaviours in both males (OR = 2.08) and females (OR = 2.17). Daily smoking is related to extreme dieting behaviour in males (OR = 1.63), but not in females. Binge drinking is related to extreme dieting in females (OR = 2.06), but not in males. Marijuana use is related to extreme dieting in males (OR = 1.30), but not in females.

Discussion

A considerable body of research has accumulated on the psychosocial and behavioural correlates of extreme weight control behaviour among adolescents. However, a large proportion of previous studies have relied exclusively on female samples, considered a limited number of correlates, or taken a gender-neutral perspective, and in doing so, assumed that the factors associated with extreme weight control behaviour are the same for males and females. The aim of the present research, therefore, was to consider the correlates of extreme weight control behaviours as a whole and separately for boys and girls, using a large representative sample of US adolescents.

Consistent with previous research (Ackard and Neumark-Sztainer, 2002, Farrow and Fox, 2011, Capitaine et al., 2011, Neumark-Sztainer et al., 1998), extreme weight control behaviours in the total sample were associated with a range of psychosocial concerns (depression, victimization experiences, suicide ideation, suicide attempts, and suicide plans) and substance use behaviours (daily smoking, marijuana use, binge drinking). This suggests that these behaviours may be symptomatic of greater underlying psychopathology or adverse life events. This is not to say that all youth who engage in extreme weight control behaviours have serious underlying problems. However, it does suggest that for some youth, reasons for engaging in these behaviours extend beyond sociocultural pressures to be thin, and that the reasons for engaging in these behaviours should be explored by health professionals. Extreme weight control behaviours were also associated with the perception with being overweight, which is again consistent with previous research (Haley et al., 2010, Vander Wal, 2012). The association of overweight perceptions with extreme weight control behaviours suggests a motivation of the reduction of weight, whether the adolescents have an accurate weight perception or have overestimated their weight. Although this may just be a perception, rather than a reflection of their true weight status, it suggests that screening questions used by

medical professionals on extreme dieting behaviour should not be limited to youth who are underweight, but should be directed at all youth. Furthermore, when working with overweight youth, it is important that healthcare professionals are aware of their elevated risk of engaging in extreme weight control behaviours and to focus on the long-term adoption of healthy eating practices and physical activity rather than on dieting. It is also important that healthcare professionals emphasise that dieting and disordered eating behaviours can be counterproductive to weight management.

When separate models were estimated for boys and girls separately, suicidal thoughts and plans, and binge drinking were related to extreme weight control behaviours in females, but not in males. By comparison, suicide attempts, daily smoking, and marijuana use were related to extreme weight control behaviours in males, but not in females. In terms of suicide behaviour, the results are consistent with previous research indicating a higher prevalence of death by suicide in adolescent males than adolescent females (Wasserman et al., 2005), but higher rates of suicide ideation and attempts in adolescent females than in adolescent males (Bridge et al., 2006). Thus, although the correlates of extreme weight control behaviours differ between males and females, fasting, diet pill use, and purging may be quick and useful markers (‘red flags’) for other risk behaviours and mental health difficulties for both genders.

The varying prevalence of these behaviours by gender and the differential correlates found in the current study suggests that there may be differing underlying cultural and gendered meanings of these behaviours and weight control more generally. Previous research has suggested that there are gender differences in the importance placed on appearance and body shape, with women more concerned with being thin, and men more concerned with being muscular (Furnham et al., 2002, Kostanski et al., 2004). Additional research is required to examine these unique experiences in greater detail. The in-depth exploration of

male weight-control behaviours is another important direction for research as the present study did not examine interest in muscularity.

Further research with population-based samples is also needed to identify the factors that predict continued use of these behaviours and progression to more serious outcomes such as eating disorders. Research efforts should also extend to examine the effects of persistent use of extreme weight control behaviours on behavioural, physical, and psychological outcomes such as weight status, suicidal thoughts and behaviour, and depression. The results from the present study suggest the need to develop and provide separate interventions for boys and girls aimed at different factors. Our results are in line with previous research indicating the complexity of relationships between psychosocial and demographic variables with extreme weight control behaviours, suggesting the need for additional assessment to maximize interventions by targeting them at specific groups (Cragun et al., 2013, Loth et al., 2014).

One limitation is the cross-sectional nature of the study design. Cross-sectional studies can establish that a predictor correlates with the outcome, but cannot determine the direction of influence between the variables. Thus, it is not possible to conclude with certainty that extreme weight control behaviours cause the adverse factors that were found to co-occur with. For instance, it is not possible to determine whether the experience of bullying leads to these unhealthy behaviours or whether children who are experiencing hopelessness or body dissatisfaction are more likely to be victimized. To establish whether a predictor functions as a risk factor requires the collection of longitudinal data. Consequently, prospective studies are needed to clarify the relations between the variables examined in the present research, and differentiate between correlates and risk factors. The results of such studies would be further strengthened by the inclusion of clinically defined diagnostic criteria and validated measures. Nonetheless, these limitations were offset by several strengths; the

study involved a large nationally representative sample of boys and girls which afforded us the opportunity to analyze the correlates of extreme weight control behaviour separately for boy and girls.

The findings of the present study underscore the importance of educating health care professionals that extreme weight control behaviours are common among adolescents. Early detection through routine screening may facilitate more effective treatment and prevent associated negative physical and psychological sequelae. The findings also suggest that these behaviours warrant discussion in routine clinical assessments and that healthcare professionals should screen all adolescents for such behaviours, as well as other health-compromising behaviours and underlying psychosocial concerns. If this is not feasible, attention should focus on those at higher risk, including adolescents who perceive themselves as overweight, those engaging in substance use behaviours and youth with psychological concerns such as hopelessness. Such as approach would be consistent with the finding that eating disorder prevention programmes targeting high-risk individuals were more effective than universal ones (Shaw et al., 2009). School-based classes focusing on nutrition and healthy eating behaviours may be an effective way of preventing the development of unhealthy weight control behaviours among adolescents. Creating or strengthening anti-bullying programmes in schools may also help prevent extreme dieting behaviours, and would be beneficial to both victims and bullies.

Extreme dieting behaviours are pervasive among adolescents. As these behaviours may ‘red flag’ poorer mental wellbeing and other risk behaviours, healthcare professionals should be aware of the need to ask young people about these behaviours or conduct routine screening of adolescents about weight control behaviours. Simple screening tools can be used, such as the SCOFF questionnaire (Morgan et al., 1999), or the *Bright Futures* guidelines (Hagan et al., 2008, Rosen, 2010).

Declaration of Conflicting Interests

The Authors declare that there is no conflict of interest.

References

(CDC), C. F. D. C. A. P. 2011. 2011 YRBS data user's guide. ftp://ftp.cdc.gov/pub/data/yrbs/2011/YRBS_2011_National_User_Guide.pdf.

ACKARD, D. M. & NEUMARK-SZTAINER, D. 2002. Date violence and date rape among adolescents: Associations with disordered eating behaviors and psychological health. *Child abuse & neglect,* 26**,** 455-473.

BEAUTRAIS, A. L. 2002. Gender issues in youth suicidal behaviour. *Emergency Medicine,* 14**,** 35-42.

BOUTELLE, K., NEUMARK-SZTAINER, D., STORY, M. & RESNICK, M. 2002. Weight control behaviors among obese, overweight, and nonoverweight adolescents. *Journal of pediatric psychology,* 27**,** 531-540.

BRIDGE, J. A., GOLDSTEIN, T. R. & BRENT, D. A. 2006. Adolescent suicide and suicidal behavior. *Journal of Child Psychology and Psychiatry,* 47**,** 372-394.

BULIK, C. M., THORNTON, L., PINHEIRO, A. P., PLOTNICOV, K., KLUMP, K. L., BRANDT, H., CRAWFORD, S., FICHTER, M. M., HALMI, K. A. & JOHNSON, C. 2008. Suicide attempts in anorexia nervosa. *Psychosomatic Medicine,* 70**,** 378-383.

CAPITAINE, M., RODGERS, R. F. & CHABROL, H. 2011. Unwanted sexual experiences, depressive symptoms and disordered eating among college students. *Eating behaviors,* 12**,** 86-89.

CRAGUN, D., ATA, R. N., DEBATE, R. D. & THOMPSON, J. K. 2013. Gender Comparisons of Unhealthy Weight-control Behaviors Among Sixth-Graders. *Journal of nutrition education and behavior,* 45**,** 450-454.

CROW, S., EISENBERG, M. E., STORY, M. & NEUMARK-SZTAINER, D. 2006. Psychosocial and behavioral correlates of dieting among overweight and non-overweight adolescents. *Journal of Adolescent Health,* 38**,** 569-574.

CROW, S., EISENBERG, M. E., STORY, M. & NEUMARK-SZTAINER, D. 2008. Suicidal behavior in adolescents: relationship to weight status, weight control behaviors, and body dissatisfaction. *International Journal of Eating Disorders,* 41**,** 82-87.

CRUZ-SÁEZ, S., PASCUAL, A., SALABERRIA, K., ETXEBARRIA, I. & ECHEBURÚA, E. 2013. Risky eating behaviors and beliefs among adolescent girls. *Journal of health psychology***,** 1359105313500683.

DE YOUNG, K. P., LAVENDER, J. M. & ANDERSON, D. A. 2010. Binge eating is not associated with elevated eating, weight, or shape concerns in the absence of the desire to lose weight in men. *International Journal of Eating Disorders,* 43**,** 732-736.

DENNARD, E. E. & RICHARDS, C. S. 2013. Depression and coping in subthreshold eating disorders. *Eating behaviors,* 14**,** 325-329.

EATON, D. K., KANN, L., KINCHEN, S., SHANKLIN, S., FLINT, K. H., HAWKINS, J., HARRIS, W. A., LOWRY, R., MCMANUS, T. & CHYEN, D. 2012. Youth risk behavior surveillance-United States, 2011. *Morbidity and mortality weekly report. Surveillance summaries (Washington, DC: 2002),* 61**,** 1-162.

FARROW, C. V. & FOX, C. L. 2011. Gender differences in the relationships between bullying at school and unhealthy eating and shape-related attitudes and behaviours. *British journal of educational psychology,* 81**,** 409-420.

FINDLAY, S. 2004. Dieting in adolescence. *Paediatr Child Health,* 9**,** 487-491.

FURNHAM, A., BADMIN, N. & SNEADE, I. 2002. Body image dissatisfaction: Gender differences in eating attitudes, self-esteem, and reasons for exercise. *The Journal of Psychology,* 136**,** 581-596.

GILLEN, M. M., MARKEY, C. N. & MARKEY, P. M. 2012. An examination of dieting behaviors among adults: links with depression. *Eating behaviors,* 13**,** 88-93.

GONSALVES, D., HAWK, H. & GOODENOW, C. 2013. Unhealthy weight control behaviors and related risk factors in Massachusetts middle and high school students. *Maternal and child health journal***,** 1-11.

HAGAN, J. F., SHAW, J. S. & DUNCAN, P. M. 2008. *Bright futures: Guidelines for health supervision of infants, children, and adolescents*, American Academy of Pediatrics Elk Grove Village, IL.

HALEY, C. C., HEDBERG, K. & LEMAN, R. F. 2010. Disordered eating and unhealthy weight loss practices: which adolescents are at highest risk? *Journal of Adolescent Health,* 47**,** 102-105.

KESSLER, R. C. 2005. Gender differences in major depression. Epidemiological findings. *In:* FRANK, E. (ed.) *Gender and Its Effects on Psychopathology.* Washington: American Psychiatric Press

KIM, Y. J., MOON, S. S. & KIM, M. J. 2011. Physical and Psycho-Social Predictors of Adolescents' Suicide Behaviors. *Child and Adolescent Social Work Journal,* 28**,** 421-438.

KOSTANSKI, M., FISHER, A. & GULLONE, E. 2004. Current conceptualisation of body image dissatisfaction: have we got it wrong? *Journal of Child Psychology and Psychiatry,* 45**,** 1317-1325.

KOWALSKI, R. M. & LIMBER, S. P. 2007. Electronic bullying among middle school students. *Journal of Adolescent Health,* 41**,** S22-S30.

KOWALSKI, R. M. & LIMBER, S. P. 2013. Psychological, physical, and academic correlates of cyberbullying and traditional bullying. *Journal of Adolescent Health,* 53**,** S13-S20.

LAMPARD, A. M., MACLEHOSE, R. F., EISENBERG, M. E., NEUMARK-SZTAINER, D. & DAVISON, K. K. 2014. Weight-Related Teasing in the School Environment: Associations with Psychosocial Health and Weight Control Practices Among Adolescent Boys and Girls. *Journal of youth and adolescence***,** 1-11.

LIECHTY, J. M. 2010. Body image distortion and three types of weight loss behaviors among nonoverweight girls in the United States. *Journal of Adolescent Health,* 47**,** 176-182.

LIECHTY, J. M. & LEE, M. J. 2013. Longitudinal predictors of dieting and disordered eating among young adults in the US. *International Journal of Eating Disorders,* 46**,** 790-800.

LOTH, K. A., MACLEHOSE, R., BUCCHIANERI, M., CROW, S. & NEUMARK-SZTAINER, D. 2014. Predictors of Dieting and Disordered Eating Behaviors From Adolescence to Young Adulthood. *Journal of Adolescent Health*.

MORGAN, J. F., REID, F. & LACEY, J. H. 1999. The SCOFF questionnaire: assessment of a new screening tool for eating disorders. *Bmj,* 319**,** 1467-1468.

NEUMARK-SZTAINER, D. & HANNAN, P. J. 2000. Weight-related behaviors among adolescent girls and boys: results from a national survey. *Archives of pediatrics & adolescent medicine,* 154**,** 569-577.

NEUMARK-SZTAINER, D., PAXTON, S. J., HANNAN, P. J., HAINES, J. & STORY, M. 2006. Does body satisfaction matter? Five-year longitudinal associations between body satisfaction and health behaviors in adolescent females and males. *Journal of Adolescent Health,* 39**,** 244-251.

NEUMARK-SZTAINER, D., STORY, M., DIXON, L. B. & MURRAY, D. M. 1998. Adolescents engaging in unhealthy weight control behaviors: are they at risk for other health-compromising behaviors? *American journal of public health,* 88**,** 952-955.

NEUMARK-SZTAINER, D., WALL, M., LARSON, N. I., EISENBERG, M. E. & LOTH, K. 2011. Dieting and disordered eating behaviors from adolescence to young

adulthood: findings from a 10-year longitudinal study. *Journal of the American Dietetic Association,* 111**,** 1004-1011.

NOLEN-HOEKSEMA, S. & GIRGUS, J. S. 1994. The emergence of gender differences in depression during adolescence. *Psychological bulletin,* 115**,** 424.

PATTON, G., CARLIN, J., SHAO, Q., HIBBERT, M., ROSIER, M., SELZER, R. & BOWES, G. 1997. Adolescent dieting: healthy weight control or borderline eating disorder? *Journal of Child Psychology and Psychiatry,* 38**,** 299-306.

PIRAN, N. & ROBINSON, S. R. 2006. Associations between disordered eating behaviors and licit and illicit substance use and abuse in a university sample. *Addictive behaviors,* 31**,** 1761-1775.

POMPILI, M., MANCINELLI, I., GIRARDI, P., RUBERTO, A. & TATARELLI, R. 2004. Suicide in anorexia nervosa: A meta-analysis. *International Journal of Eating Disorders,* 36**,** 99-103.

ROSEN, D. S. 2010. Identification and management of eating disorders in children and adolescents. *Pediatrics,* 126**,** 1240-1253.

SHAW, H., STICE, E. & BECKER, C. B. 2009. Preventing eating disorders. *Child and adolescent psychiatric clinics of North America,* 18**,** 199.

THØGERSEN-NTOUMANI, C., NTOUMANIS, N. & NIKITARAS, N. 2010. Unhealthy weight control behaviours in adolescent girls: A process model based on self-determination theory. *Psychology and Health,* 25**,** 535-550.

UTTER, J., DENNY, S., ROBINSON, E., AMERATUNGA, S. & CRENGLE, S. 2012. Identifying the 'red flags' for unhealthy weight control among adolescents: Findings from an item response theory analysis of a national survey. *International Journal of Behavioral Nutrition and Physical Activity,* 9**,** 99.

VANDER WAL, J. S. 2012. Unhealthy weight control behaviors among adolescents. *Journal of health psychology,* 17**,** 110-120.

WASSERMAN, D., CHENG, Q. & JIANG, G.-X. 2005. Global suicide rates among young people aged 15-19. *World Psychiatry,* 4**,** 114.

Table 1. Descriptive statistics and frequencies for categorical variables

Variable		***N***	**%**
Extreme dieting behavior*			
Total sample		2545	16.5
Girls		1666	21.6
Boys		862	11.3
Hit by partner**		1596	9.4
Rape***		1272	8.0
Bullied school**		2644	20.1
Bullied elec.**		2066	16.2
Hopelessness**		4537	28.5
Suicide thoughts		2424	15.7
Planned suicide**		2015	12.8
Suicide attempt**		1179	7.6
Weight perception			
	Very or slightly under	2154	14
	About right	8444	54.7
	Slightly or very over	4542	29.4
Binge drinking*		3268	21.2
Daily smoking***		1310	8.5
Marijuana use***		3530	22.9

*Note: *= last month, **= last 12 months, ***=lifetime.*

Table 2. Total group logistic regression of demographics, victimisation, suicidality and weight perception on extreme dieting behaviour

Included variables		β (*SE*)	95% CI for OR		
			Lower	OR	Upper
Demographics	12 years and under				
	13 years old	.66 (1.14)	.21	1.93	17.83
	14 years old	.26 (.67)	.35	1.30	4.86
	15 years old	.41 (.67)	.41	1.51	5.56
	16 years old	.43 (.67)	.42	1.53	5.64
	17 years old	.38 (.67)	.40	1.47	5.41
	18 years and above	.45 (.67)	.42	1.56	5.77
	Sex	.73 (.07)	1.83	2.08***	2.36
	Hispanic	.12 (.06)	.99	1.12	1.27
Victimisation	Hit by partner	.30 (.09)	1.13	1.35***	1.62
	Rape	.45 (.09)	1.30	1.57***	1.88
	Bullied in school	.32 (.08)	1.20	1.38***	1.60
	Bullied electronically	.28 (.08)	1.14	1.33***	1.55
Depression	Hopelessness	.72 (.07)	1.81	2.06***	2.35
Suicidality	Suicide thought	.38 (.09)	1.21	1.46***	1.76
	Suicide plan	.31 (.09)	1.13	1.36***	1.65
	Suicide attempt	.28 (.11)	1.06	1.32**	1.64
Weight perception	About right				
	Underweight	-.11 (.10)	.73	.90	1.09
	Overweight	.76 (.06)	1.88	2.13***	2.41
Drug use	Daily smoking	.28 (.09)	1.09	1.32**	1.59
	Binge drinking	.51 (.07)	1.45	1.68***	1.93
	Marijuana use	.15 (.08)	1.00	1.16*	1.34

Note: OR = Odds ratio, 95% CI = Confidence interval, ***p <.001, ** p <.01, *p <.05

Table 3. Influences on extreme dieting behaviour by gender

		Males				*Females*			
			95% CI for OR				95% CI for OR		
	Included variables	β (*SE*)	Lower	OR	Upper	β (*SE*)	Lower	OR	Upper
Age	12 yr								
	13 yr	-.52 (1.66)	.02	.60	15.55	2.19 (1.52)	.43	8.90	182.71
	14 yr	-.88 (.87)	.08	.41	2.24	1.67 (1.01)	.74	5.31	38.24
	15 yr	-.71 (.85)	.09	.49	2.62	1.80 (1.00)	.85	6.07	43.29
	16 yr	-.48 (.85)	.12	.62	3.28	1.70 (1.00)	.77	5.50	39.04
	17 yr	-.77 (.85)	.09	.47	2.45	1.81 (1.00)	.85	6.08	43.29
	18 yr +	-.53	.11	.59	3.13	1.78 (1.00)	.95	1.11	1.29
	Hispanic	.15 (.11)	.93	1.16	1.44	1.00 (.08)	.95	1.11	1.29
	Hit by partner	.35	1.05	1.42*	1.92	.31 (.11)	1.09	1.37**	1.72
	Rape	.45 (.21)	1.03	1.56*	2.38	.45 (.11)	1.27	1.56***	1.92
	Bullied in school	.25 (.13)	1.00	1.29*	1.66	.38 (.09)	1.22	1.46***	1.76
	E-Bullied	.39 (.15)	1.10	1.48**	1.98	.22 (.09)	1.03	1.24*	1.49
	Hopeless-ness	.57 (.12)	1.40	1.78***	2.25	.80 (.08)	1.90	2.23***	2.62
	Suicide thought	.22 (.17)	.89	1.25	1.75	.45 (.12)	1.25	1.57***	1.97
	Suicide plan	.30 (.17)	.96	1.35	1.90	.33 (.12)	1.10	1.39**	1.75
	Suicide attempt	.44 (.20)	1.04	1.55*	2.31	.20 (.14)	.94	1.22	1.59
Weight	About right								

Under-weight	.03 (.15)	.77	1.03	1.38	-.24 (.14)	.60	.79	1.04
Over-weight	.73 (.11)	1.67	2.08***	2.58	.78 (.08)	1.87	2.17***	2.52
Daily smoking	.49 (.15)	1.22	1.63***	2.18	.15 (.13)	.91	1.17	1.50
Binge drinking	.12 (.13)	.88	1.13	1.45	.72 (.09)	1.72	2.06***	2.46
Marijuana use	.26 (.12)	1.02	1.30*	1.65	.08 (.09)	.90	1.10	1.31

Note: OR = Odds ratio, 95% CI = Confidence interval, ***p <.001, ** p <.01, *p <.05